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I. R^e-

- I. *Remarks on the Height of Mountains in general, and of those of Swisserland in particular, with an Account of the Rise of some of the most considerable Rivers of Europe.* By J. G. Scheuchzer, M. D. &c.

IN a former Paper, I took Notice that *Dicaearchus* found *Mount Pelius* in *Thessalia*, to be 1250 Paces high, which make 6250 *Roman*, or 6822 *Paris* Feet, a Height which we may well pronounce too great even for the absolute Height of *Mount Pelius*, I mean its Rise above the Level of the Sea. Conform to the Determination of *Dicaearchus*, I mentioned, that *Plutarch* fixes the Height of the highest Mountains, and the greatest Depth of the Sea to 10 Stadia, and *Cleomedes* affirms, that they cannot exceed 16 Stadia. The celebrated *Galileus de Galileis* is one of the most modest among the modern Writers on this Head: For he says, * that the highest Mountains do not rise above a Mile, or 8 Stadia, or 5000 old *Roman Vespasian* Feet, which make 5458 *Paris* Feet above the Level of the Sea, which we shall find by and by to agree pretty well with some of the highest Mountains in *France*, and may conjecture to do so with those in *Italy*. *Kepler* went rather too far † when he assigned the Mountains of *Rhetia* (thought the highest in *Swisserland*) a Height of 26 Stadia, or 10000 old *Roman Vespasian* Feet, which make 10916 *Paris* Feet. The Opinions of some other antient and modern Geographers and Mathematicians, will appear better by the Table annexed.

* Nuntius Sidereus, p. 14.

† Astronom. Optic, p. 129, 135. & Epitom. Astronom. lib I. pag. 26.

A Table shewing the Height of Mountains according to
several antient and modern Writers.

	Stadia.	Old Roman Vespasian Feet.	Paris Feet.
<i>Strabo</i> (<i>Lib. II. Geog.</i>) says, that the highest Mountain, call- ed by him <i>Petra Sogdiana</i> , is of - - - - - }	30	18750	20468
<i>Pererius</i> (<i>Lib. XII. in Ge- nesin</i>) determines the highest Mountains to - - - - - }	32	20000	21832
<i>Leo Bapt. Albertus</i> (<i>Architect. Lib. x. Cap. i.</i>) to - - - - - }		22500	23661
<i>Atb. Kircher.</i> (<i>Ars magn. luc. & umbr. P. II. Probl. 5.</i>) brings them to - - - - - }	43	26875	29337
<i>Fromond.</i> (<i>Lib. I. Meteor. Cap. 2. Art. i.</i>) - - - - - }	64	40000	43664
<i>Gilbertus de magnet. L. IV. C. i.</i> <i>Pliny</i> (<i>Lib. III. Cap. lxiv.</i>) ac- cording to the Explanation of <i>Fortunius Licetus</i> (<i>de Lunæ Luce subobscura, Lib. II. p. 306.</i>) to - - - - - }	128	80000	87328
	400	250000	272900
<i>Ricciolus, Geophr.</i> (<i>Lib. VI.</i>) is of Opinion, in Pursuance of what he imagines to have demon- strated of the Mountains <i>A- thos</i> and <i>Caucasus</i> , that possi- bly there may be Mountains of - - - - - }	512	320000	349312

Now,

Now, in Opposition to this Table, wherein the Heights must needs, upon first View, appear romantick and unnatural, let us consider the Height of such Mountains, as have been measured, either by Trigonometrical or Barometrical Observations.

In *England*, the Height of *Snowdon-hill*, one of the highest Mountains in *Wales*, was measured Trigonometrically, by Mr. *J. Caswell* of *Oxford*, and found to be of 1240 Yards, or 3720 *English* Feet, which make 3488 *Paris* Feet. At the Top of this Mountain, the Mercury subsided to 25'' 6''', which being reduced to *Paris* Measure, make just 24''. Now in the Tables above, the Height of the Place where the Mercury subsides to 24'', is, according to *Mariotte*, of 544 Toises, two Foot, or 3266 Foot above the Level of the Sea, according to *Cassini*, 676 Toises, or 4056 Feet, and according to my Uncle's Calculation 559° 2', or 3356', so that *Mariotte* comes 222 Feet short of its Height, as it was determined Trigonometrically, Dr. *Scheuchzer* but 132', but *Cassini* exceeds this Height by 568 Feet, which confirms again, as I have shewn in a former Paper, that the *Mariottian* Table is preferable to that of *Cassini*, though pretended to have been corrected upon the former, and that that of Dr. *Scheuchzer* is an Improvement upon both. According to the Observation made by Dr. *Halley*, May 26, 1697, the Mercury stood at the Top of *Snowden-hill*, at 26'' 1''' *English*, which, if reduced as above, would give the Height of the Mountain something less.

In *France*, when the Meridian Line, first begun in 1669, was continued in 1703, the Heights of several Mountains, particularly in the South of *France*, were determined Trigonometrically by the Members of the

Royal Academy of Sciences : And I find up and down in their Memoirs, the Heights of the following.

	Height in Toifes. Feet.
<i>Mont Clairét in Provence</i> -	277 or 1662
<i>La Massane in Roussillon</i> - -	397 — 2382
The same according to another Observation - - - - - }	408 — 2448
<i>Bugarach, a Mountain in Lan- guedoc</i> - - - - - }	648 — 3888

Mountains in *Auvergne*.

<i>Le Puy de Domme, near Clermont</i>	810 — 4860
<i>La Courlande</i> - - -	838 — 5028
<i>La Coste</i> - - -	851 — 5106
<i>Le Puy de Violent</i> - - -	853 — 5118
<i>Le Cantal</i> - - -	984 — 5904
<i>Le Mont d'or</i> - - -	1030 — 6180

In the County of *Avignon*.

<i>Le Mont ventoux</i> - - -	1036 — 6216
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Pyrenean Mountains.

<i>S. Barthelemy dans le païs de foix</i> - - - }	1185 — 7110
<i>La Montagne du Mouffet</i> -	1258 — 7548
<i>Le Canigou</i> - - -	1440 — 8640

Before I proceed farther, I must beg Leave to observe, that the Heights of these Mountains, in the main, seem rather too great. This indeed is easily accounted for, as they were measured by Trigonometrical Observations, which will, as I have took Notice above, because of the
Re-

Refraction of the Air, give the Heights greater than they actually are. But what confirms it still more, is, that according to the Tables above, the Numbers which answer to the Heights of the Mercury, as they were observed at the Top of some of those Mountains, are considerably less, and that even *Monf. Cassini's* own Numbers, which yet we have by some undoubted Experiments shewn to be too great, fall often short. It will be enough to mention two or three Instances. At the Tower of *Massane* in *Roussillon*, the Mercury stood at $25'' 5'''$, and the Height of that Place was determined trigonometrically, of - - 397 Toises.

Now $25'' 5'''$ answer according to	}	342 0
<i>Mariotte</i> , to - - -		
According to <i>Cassini</i> , - - -	- -	392 4
According to Dr. <i>Scheuchzer</i> - - -	- -	350 0

At the Top of the Mountain called *la Coste* in *Auvergne*, the Mercury stood, *Oct.* 9, 1700, at $23''' 4'''$, and the Height of this Mountain was determined Trigonometrically of - - 851⁰ Toises.

Now $23''' 4'''$ answer according to <i>Mariotte</i> , to	}	644 ⁰ 1'	}	differ.	}	206 ⁰ 5'	
<i>Cassini</i> - - -						- 826 1	24 5
Dr. <i>Scheuchzer</i> - - -						- 661 5	189 1

The Difference is still more considerable with Regard to the high Mountain <i>Mont d'or</i> en <i>Auvergne</i> , the Height whereof was determined Trigonometrically to	}	- -	1040 Toises.

At the Top of this Mountain the Mercury fell, according to an Observation made by *F. Sebastien Truchet*, June 8, 1705, to $22'' 11'''$, which answer according to

<i>Mariotte</i> , to	-	$707^{\circ} 5'$	} differ. {	$332^{\circ} 1'$
<i>Cassini</i> to	-	$925 \quad 1$		$114 \quad 5$
<i>Dr. Scheuchzer</i>	-	$727 \quad 3$		$312 \quad 3$

I come now to the Mountains of *Swisserland*. The Barometrical Observations made by my Father upon several of the highest will convince us, that they rise aloft, above all the neighbouring ones in *France, Spain, Italy* and *Germany*. And that it must be so appears farther, because from their elevated Tops, they disperse their Waters to all the *European* Kingdoms and Provinces around them. Nay, I doubt not, but that they may vye in Height with the most considerable Mountains in any other Part of the known Globe. *Swisserland* it self, I mean its Valleys and lower Parts, as they are considerably remote from the Sea, rise also in Proportion above the Level of it. 'Tis true, the Ascent thither is but gradual, in Proportion to the Remoteness. At *Zuric*, for Instance, which lies towards the Northern Borders of *Swisserland*, the mean Height of the Barometer hath been observed of $26'' 5'''$, which give the Elevation of that Town, above the Level of the Sea, according to *Mariotte*, 205 Toises, 4 Foot, or $1234'$, according to *Dr. Scheuchzer*, $210^{\circ} 4'$, or $1264'$, and according to *Cassini*, $221^{\circ} 4'$, or $1330'$. This Town is distant from the Mouth of the Rhine, which is the nearest Part of the Ocean, at least 375 *English* Miles, or an hundred marine *French* Leagues, and from *Genoa* which is nearest upon the Mediterranean, 225 *English*

glish Miles, or 62 *French* marine Leagues. So that going down from *Zuric* Northwards towards the Sea, the Descent, or Fall, is but something more than 12 Foot, for a marine League of *France*, if we suppose a streight Line to be drawn from *Zuric* to the Sea-shore in *Holland*; but it is much greater going Southward towards the Mediterranean, where it comes at least to 20 Foot for one League. Nay, if we consider that the highest Mountains of *Swisserland* lie almost directly between *Zuric* and the Mediterranean Shores, we must allow so much more in Proportion, as those Mountains are elevated above the Horizon of *Zuric*, and how great and sudden this Elevation be, will appear by the following Observations.

At *Ennen Sewen gen Aweren* in the Ascent of the high Mountain *Freyberg*, in the Canton of *Glarus*, which lies South East of *Zuric*, the Mercury was observed *Sept. 11, 1710*, at 23" 10"', which gives the Height of that Place above the Level of the Sea, according to

<i>Mariotte</i>	-	-	569 ^a	2'	or	3416'
<i>Dr. Scheuchzer</i>	-	-	584	4	—	3508
<i>Cassini</i>	-	-	712	3	—	4275

Upon *Scherf*, one of the Branches of the *Freyberg*, the Mercury fell *Sept. 12, 1710*, to 21" 8"', which gives the Height of that Part of the Mountain according to

<i>Mariotte</i>	-	-	906 ^a	1'	or	5437'
<i>Dr. Scheuchzer</i>	-	-	931	2	or	5588
<i>Cassini</i>	-	-	1247	4	or	7486

Still

Still higher upon *Blattenstock*, another Part of the same Mountain, the Mercury fell on the same Day to $21'' 6'''$, which answer according to

<i>Mariotte</i> , to	-	-	933°	$2'$	or	$5600'$
Dr. <i>Scheuchzer</i>	-	-	959	2	or	5756
<i>Cassini</i>	-	-	1293	3	or	7761

Hence from *Zuric* to the *Blattenstock* near the Top of the *Freyberg*, there is, in less than three Days Journey, a Rise of 4366 Feet, according to *Mariotte*, and 4492, according to Dr. *Scheuchzer*, that is, more than three times the Elevation of *Zuric* above the Level of the Sea.

At *Guppen ob Schwanden*, in the same Canton of *Glarus*, the Mercury was observed, *August 5, 1705*, at $23'' 4'''$, which give, according to

<i>Mariotte</i>	-	-	644°	$1'$	or	$3865'$
Dr. <i>Scheuchzer</i>	-	-	661	5	or	3971

(I omit giving the Numbers according to the Tables of Mr. *Cassini*, having already shewn, that they are too great) The Height of this Mountain is nearly the same with the celebrated *Puy de Domme*, where *Monf. Perier* observed the Mercury, *Sept. 19, 1648*, at $23'' 2'''$.

Upon *Joch*, a high Mountain in the Territory of *Engelberg*, where it confines upon the Canton of *Bern*, full South of *Zuric*, the Mercury stood, *June 23, 1706*, at $21'' 4'''$, which gives the Height of that Mountain according to

<i>Mariotte</i>	-	-	961°	$0'$	or	5766
Dr. <i>Scheuchzer</i> ,	-	-	987	4	or	5926

This Mountain, though very high, is far from being the highest in that Neighbourhood, for next to it there

there rises another called the *Titlisberg*, covered with everlasting Snow, which we may, upon a moderate Computation, pronounce at least 1000 Foot higher than the Top of the *Joch*, and consequently one of the highest in the Country.

Upon the *Avicula*, by the *Italians* called *Monte del' Uccello*, and by some *S. Bernhard's Mountain*, from a Chappel built in Honour of that Saint, a high Mountain in *Rhætia*, towards *Italy*, the Mercury was observed, *July 30, 1707*, at $22^{\circ} 11'''$, which give according to

<i>Mariotte</i>	-	-	707 ⁰	5'	or 4247'
<i>Dr. Scheuchzer</i>	-	-	727	3	4365

This Height must be understood only of that Part of the Mountain which is passed over by Travellers, the Mountain it self rising considerably above it, and the *Adula*, or *Διαδεδάλας* of *Strabo*, *Geog. L. III.* of which the *Avicula* is only a Part, being still higher. The *Rhenus posterior*, or *Hinder Rhein*, and the *Moüss*, which at last loses itself into the *Tessin*, near *Bellinzone*, not much above the Entry of the *Tessin* into the Lake of *Locarno*, arise upon this Mountain.

At *Santa Maria*, upon the *Luckmannier Berg*, by some *S. Barnaby's Mountain*, which is likewise a Branch of the *Adula*, the Mercury stood, *Aug. 9, 1725*, as upon the *Avicula*, at $22^{\circ} 11'''$, which shews the Height of these two Places to be equal.

In the Alp *San Porta*, near the Source of the *Hinter Rhein*, *Rhenus posterior*, five Hours and a half from *Speluga*, *Splügen* in *Rhætia*, the Mercury was observed, *July 29, 1707*, at $21^{\circ} 4'''$, where it stood likewise upon the above-mentioned Mountain *Joch*, whither the Reader is referred for the Height of this Alp.

At *Splügen* itself, the Mercury stood the same Morning early, at $23^{\circ} 4''$, which give the Elevation of *Splügen* according to *Mariotte* $644^{\circ} 1'$ or 3865, and according to Dr. *Scheuchzer*, $661^{\circ} 5'$ or 3971'. So that the Fall of the Rhine from the Alp aforesaid to *Splügen*, in five Hours and a half, comes, according to *Mariotte*, to 1901, and according to Dr. *Scheuchzer*, to 1955 *Paris* Feet perpendicular.

At the *Capuchins*, upon the high Mountain *S. Gothard*, a celebrated Passage out of *Swisserland* into *Italy*, the Mercury stood, *June* 30, 1705, at $22^{\circ} 0'$, which gives the Height of that Passage, which with Regard to the highest Tops of *S. Gothard*, lies but as it were at the Foot of a high Mountain, according to *Mariotte* 852° , or 5112', and according to Dr. *Scheuchzer*, $875^{\circ} 5'$, or 5255, above the Level of the Sea.

Upon the *Furca*, a high Mountain between the *Urseren Thal*, *Ursaria Vallis*, and the upper *Vallesia*, and one of the Branches of the *S. Gothard*, the Height of the Mercury in the Barometer was observed, *July*, 31, 1707, at $21^{\circ} 5''$, which give the Height of this Mountain above the Level of the Sea, according to *Mariotte*, $947^{\circ} 1'$ or 5683', and according to Dr. *Scheuchzer*, $973^{\circ} 3'$ or 5841. Near this Mountain there are others, which cannot be less than 800 or 900 Foot higher.

These Mountains, I mean the *Avicula*, the *Luckmannier Berg*, the *S. Gothard*, and the *Furca*, together with the *Grimsula*, the *Crispalt*, the *Sempronier*, or *Sempronius Mons*, the *Adula*, and a Chain of others, are the *Lepontia Alpes* of *Pliny* * and the *Summa*

* Lib. iii. c. xx.

Alpes of Caesar *. They begin in the upper *Vallesia*, traverse the Canton of *Uri*, and so run on Eastwards, a-cross the Country of the *Grisoons*, towards *Tirol*. Their greatest Height above the Level of the Sea, may be fixed in round Numbers to 7500, or 8000 *Paris Feet*.

'Tis upon these very Mountains, that some of the most considerable Rivers of *Europe* take their first Rise, within very small Distances of each other. The *Rhofne*, for Instance, *Rhodanus*, by *Marcellinus* called, *maximi nominis flumen*, and by *Varro*, *Fluvius inter tres Europæ maximus*, arises from two *Gletchers*, as we call them, or *Montes glaciales*, huge Mountains of Ice, near the *Furca*, whose Height hath been above determined, and thence runs with great Impetuosity down *Vallesia*, the *Wallisserland*, forming a long Valley, surrounded on both Sides with huge Mountains, till it looses its Waters and Name in the *Lacus Lemannus*, or Lake of Geneva, but resumes it again near the Town of Geneva, whence it flows with a more gentle Descent through some Provinces of France into the Mediterranean Sea.

The *Thesin*, *Ticinus*, by *Claudian*, in his Panegyric upon the Consulate of the Emperor *Honorius*, called *Pulcher*, the handsome, takes its first Rise from two small Lakes upon the S. *Gothard*, and some lateral Sources from the *Lago sopra la Cima di Pettine*, upon a Mountain called *Pettine*, the *Lago della Sella*, the Lake of *Rottom* upon the *Luckmannier Berg*, the Lake of *Tom*, and the Lake of *Bedretto*, upon a Mountain of this Name. It descends the *Lavinia Vallis*, or *Liviner Valley*, and in its Way to the Lake of

* De Bello Gallico l. iii.

Locarno, receives many Brooks and Rivulets from the adjoining Mountains : It unites its Waters with the *Po*, near *Pavia*, and looses itself jointly with that River into the Adriatick Gulf.

The Rhine, *Rhenus*, by *Cæsar de Bello Gallico* termed, *latissimus atque altissimus*, arises in three several Branches, which are called *Rhenus anterior*, *posterior*, & *medius*, the *further*, the *hinder*, and *middle Rhine*. The *hinder Rhine* takes its Rise upon the high Mountain *Avicula*, *Colmen del Ocello*, Part of the *Adula*, in the Alp *San Porta*, from a *Gletcher*, or Ice-mountain, which extends in Length full two Hours. The *middle Rhine*, *Rhenus medius*, arises upon the *Luckmannier Berg*, which is likewise Part of the *Adula*, in the upper Part of a Valley called *San Maria*, opposite to one of the Sources of the *Theſin*. The *furthermost Rhine*, *Rhenus anterior*, arises upon that Branch of the *Crispalt*, which is called *Cima del Badut*, *Badüz*, and soon receives several lateral Branches from the *Alps Mugels* and *Cornera*. My present Purpose will not suffer me to pursue the Course of this River in its several Branches. Near the Monastery of *Disentis*, the further and middle Rhine join together, and the united Stream falls into the hinder Rhine, near *Reichenau*. Below *Rheineck*, the Rhine falls into the *Lacus Bodamicus*, or *Boden Sea*, and comes out of it near *Stein*; whence washing for sometime the Borders of *Switzerland*, it then traverses great Part of *Germany* in a very irregular Course, till at last, in *Holland*, it looses itself into the great Ocean.

The *Reuß*, *Rufa*, arises from a small Lake called *Lago di Luzendro*, upon the *S. Gotthard*, but soon receives a considerable Inforcement from the *Furca*,
and

and near *Urselen*, another from a mountainous Lake in *Oberalp*. Near *Flüelen*, not far from *Ury*, it enters the IV. *Waldstetten Sea*, *Lacus quatuor Civitatum Sylvestrium*, but resumes its Course and Name at *Lucern*, and at last falls into the *Aar* below *Windisch*, *Vindonissa*.

The *Aar*, *Arola*, *Arula*, arises upon the high Mountain *Grimfula*, in the upper *Vallesia*. About three Hours below that, it falls into the Lake of *Brientz*, and out of that, not far from the Monastery *Interlachen*, into the Lake of *Thun*, which it leaves near the Town of *Thun*, and thence running by *Bern*, *Solothurn*, and so down, falls at last, after many Windings and Turnings into the Rhine near *Coblentz*, *Confluentia*, probably so called from the uniting of these two considerable Rivers. But to proceed.

Gemmius Mons, the *Gemmi*, is a very high and steep Mountain in *Vallesia*, over which there is a Passage, but only in Summer-time, from the *Fruttinger Valley*, in the Canton of *Bern*, to the Mineral Waters at *Leuk* in *Vallesia*. The Descent, on the South-side of this Mountain, is steep and frightful, even to the Aspect, beyond what can be imagined, being a narrow Path, cut on the Side of almost perpendicular Precipices, sometimes with trembling wooden Bridges, or Planks over the Clefs in the Mountain, and here and there supported with low Walls. Having been geometrically measured, it was found of 10110 Feet in Length, or rather Height, its many Windings and Turnings included. At a small Cottage, called *Zur Dauben*, a poor resting Place for weary Travellers, being the highest Part of the Mountain which is passable, the Mercury subsided July 1, 1709, to 21" 3" which gives the Height
of

of that Place, according to

<i>Mariotte</i>	-	-	-	974° 5' or 5849'
And Dr. <i>Scheuchzer</i>	-	-	-	1002 0 or 6012

Not far from this Cottage, is a small mountainous Lake, called the *Dauben Sea*, or the *Pidgeons Lake*, encompassed on all Sides with high Mountains, the Tops whereof, for their Steepness, it would be impossible to reach. At *Kandelflag*, the first Village in the *Frutinger Valley*, in the Territory of *Bern*, going up to the *Gemmi*, the Mercury rose on the same Day to 24" 2"', which give according to

<i>Mariotte</i>	-	-	-	520° 1' or 3121'
Dr. <i>Scheuchzer</i>	-	-	-	534 1 or 3205

And at *Müllenen*, at the Foot of the *Gemmi*, it stood at 25" 7"', which answer according to

<i>Mariotte</i> to	-	-	-	318° 5' or 1913'
Dr. <i>Scheuchzer</i>	-	-	-	327 0 or 1962

On the other Side of the *Gemmi*, at *Leück*, a celebrated Place for its Mineral Waters, the Mercury was observed *July 2*, and *July 5*, 1709, at 23" 9"', which answers according to *Mariotte*, to 581° 4', or 3490', and according to Dr. *Scheuchzer*, to 597° 3', or 3585'. So that the Cottage *Zur Dauben*, rises above *Leück*, according to

<i>Mariotte</i> ,	-	-	-	-	2359'
Dr. <i>Scheuchzer</i>	-	-	-	-	2427

Above *Müllenen*, in the *Frutinger Valley*, according to

<i>Mariotte</i>	-	-	-	-	3936'
Dr. <i>Scheuchzer</i>	-	-	-	-	4050

And

And the perpendicular Height of the *Gemmi*, above the Level of the Sea, considerably exceeds 6000 *Paris* Feet.

But high above all the Mountains of *Swisserland* rises the *Stella*, *Piz Stail*, a steep Mountain in the *Schamser* Valley, in *Rhætia*, or the *Grisoons*, the Height whereof was by my Uncle Dr. *John Scheuchzer*, by some Observations made in the Year 1709, determined to 9585 *Paris* Foot, above the Level of the Sea, according to his own Calculation, or 9441 according to *Mariotte*, and 12196 according to *Cassini*: A Height, which the *Rupicapra*, or *Shamoys* themselves scarce venture to ascend. And 'tis to these only, and the like Heights the following Verses of *Silius Italicus* ought to be applied.

*Cuncta gelu, canâque æternùm grandine tecta,
Atque æviglaciem cohibent: riget ardua montis
Ætherei facies, surgentique obvia Phœbo
Duratas nescit flammis mollires Pruinas.
Nullum ver usquam, nullique æstatis honores,
Sola jugis habitat diris, sedesque tuetur
Perpetuas deformis hyems ———*

Having thus determined the Heights of the Mountains of *Swisserland* from Barometrical Observations, I will now close these Remarks, which are insensibly grown to a much greater Length, than I at first intended they should, with a few general Observations on the natural History of that Country, arising from the Height of its Mountains.

The first Observation shall regard the Lakes, of which there are several, and very remarkable ones, in
and.

and upon the Borders of *Swisserland*, which will afford me a singular Instance of Divine Providence. The Ascent of the Mountains of *Swisserland* being so very sudden and quick, that as I have above shewn, the Elevation of the Mountains in the Canton of *Glarus* above the Horizon of *Zuric*, though not quite three Days distant, is more than three Times as great, as the Elevation of *Zuric* itself above the Level of the Ocean, of which it is upwards of 375 *English* Miles distant in a streight Line ; and so in Proportion of others ; and the Rivers, which arise in these Mountains, rushing down, in Consequence of so quick a Descent, with great Force and Impetuosity, it was to be feared, they would often overflow their Banks, and cause frequent Inundations in the flat Countries, (of which there are too many Instances in our own Vallies and Plains,) if this Force and Impetuosity was not in great Measure broke, and their Waters disposed to a more gentle Descent. And this is effectually done by those great Receptacles of Water, the Lakes, which are besides of infinite Use to the Inhabitants around them, supplying them with Plenty of Fish for their Sustenance, and enriching them by the Facility with which Commerce may be carried on over them. Thus the *Rhine* falls into the *Lacus Bodamicus*, *Boden-Sea*, the *Rhosne* into the *Lacus Lemannus*, or *Lake of Geneva*, the *Muesa* and *Thefin* into the *Lake of Locarno*, the *Reüs* into the *Lake of Lucern*, the *Adda* and *Maira* into the *Lake of Como*, the *Lint*, or *Limat*, into the *Lake of Zuric*, the *Aar*, into the Lakes of *Brientz* and *Thun*. And it seems, that the more considerable the Rivers are, and the more impetuous their Course, so much the greater must the Receptacles be, wherein they are to loose their
Force

Force and Rapidity. The *Lake of Geneva*, and the *Boden-Sea*, the two largest in *Switzerland*, evidently evince what I here assert, and the others above-named gradually decrease in Largeness, in proportion as the Rivers, which fall into them, are less and less rapid.

The extream Smallness of the Alpine Plants is another Observation, I intend to make. They become less and less, in proportion as the Mountains, upon which they grow, rise higher. Whether this be owing to the Sharpness and Purity of the Alpine Air, or the decreasing Pressure of the Atmosphere, which is far less upon Mountains than in Valleys and lower Countries, or to a Want of a sufficient Quantity of subterraneous Heat, to push the Nourishment into the Roots and Vessels of the Plants, or rather to a joint Concurrence of these and other Causes, would require a more leisurely Consideration. The Thing itself is an indisputable Matter of Fact, and it extends also to Trees and Shrubs, which become smaller, as they grow higher. Nay, what is still more remarkable, no Trees will grow beyond a certain Height, which is the Reason why the Tops of Mountains appear so bare and naked, if viewed at a Distance, though a curious Traveller shall not fail meeting upon their rich Pastures with an agreeable Variety of beautiful Plants. The Height, where the Trees cease to grow, hath been found, by Barometrical Observations, nearly to be the same in divers Parts of *Switzerland*. Otherwise, the Smallness of the Alpine Plants is abundantly compensated by the Richness of their Virtues, which are, as it were, purposely centred there into so narrow a Compass.

But to another Observation. The Mountains are much more abrupt, and steep, and the Precipices greater

to the South, than to the North, and Westwards than Eastwards. Many Instances of this might be given in particular Mountains in *Switzerland*, as the *Gemmi*, the *Mons fractus* and so forth ; but it is also evidently true with Regard to the whole. Those are the highest Mountains, which separate *Vallesia*, the Canton of *Uri*, and the several Leagues of the *Grisons*, from *Savoy*, *Piemont*, and the *Tirol*, which lie to the South, or South-East. Those very Countries are, as it were, one continued Set of high Mountains, quite to the Mediterranean Sea, and the like Structure seems to be continued farther on into that Sea itself. The *Pyrenean* Mountains also are but a Continuation of that vast Chain, which begins in the *Lepontie Alpes*, or the Mountains in the upper *Vallesia*, the Canton of *Ury* and *Rhætia*, and from thence spreads itself chiefly West and South. On the contrary to the East and North they break off by Degrees into gentle Plains, which appears evidently by the vast Tracts of Ground, which the *Rhine* for Instance, and the *Danube* compass, before they lose themselves, the one into the *German* Ocean, the other into the black Sea, whereas the *Rhofne*, on the other Side, quickly and with a proportionable Velocity reaches the Mediterranean. The same Observation, with Regard to the abrupt Steepness of Mountains to the South and West, holds true in other Parts of *Europe*, remarkably in *England* and *Norway*, more or less in other Countries. And so far as our Maps, and the Accounts of Travellers go, the same Thing is observable in other Parts of the World, but most evidently in the high Mountains of *Peru* and *Chili* in *South America*, which terminate very abruptly Westwards into the *Pacifick* Sea, but gradually decline
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